

NASA's Space Launch System: A Transformative Capability for Exploration

Dr. Kimberly F. Robinson
Jerry Cook
Space Launch System Program
NASA Marshall Space Flight Center XP02; 1.256.544.5181
kimberly.f.robinson@nasa.gov

Abstract

Currently making rapid progress toward first launch in 2018, NASA's exploration-class Space Launch System (SLS) represents a game-changing new spaceflight capability, enabling mission profiles that are currently impossible. Designed to launch human deep-space missions farther into space than ever before, the initial configuration of SLS will be able to deliver more than 70 metric tons of payload to low Earth orbit (LEO), and will send NASA's new Orion crew vehicle into lunar orbit. Plans call for the rocket to evolve on its second flight, via a new upper stage, to a more powerful configuration capable of lofting 105 t to LEO or comanifesting additional systems with Orion on launches to the lunar vicinity. Ultimately, SLS will evolve to a configuration capable of delivering more than 130 t to LEO. SLS is a foundational asset for NASA's Journey to Mars, and has been recognized by the International Space Exploration Coordination Group as a key element for cooperative missions beyond LEO. In order to enable human deep-space exploration, SLS provides unrivaled mass, volume, and departure energy for payloads, offering numerous benefits for a variety of other missions. For robotic science probes to the outer solar system, for example, SLS can cut transit times to less than half that of currently available vehicles, producing earlier data return, enhancing iterative exploration, and reducing mission cost and risk. In the field of astrophysics, SLS' high payload volume, in the form of payload fairings with a diameter of up to 10 meters, creates the opportunity for launch of large-aperture telescopes providing an unprecedented look at our universe, and offers the ability to conduct crewed servicing missions to observatories stationed at locations beyond low Earth orbit. At the other end of the spectrum, SLS opens access to deep space for low-cost missions in the form of smallsats. The first launch of SLS will deliver beyond LEO 13 6U smallsat payloads, representing multiple disciplines, including three spacecraft competitively chosen through NASA's Centennial Challenges competition. Private organizations have also identified benefits of SLS for unique public-private partnerships. This paper will give an overview of SLS' capabilities and its current status, and discuss the vehicle's potential for human exploration of deep space and other game-changing utilization opportunities.